

## Advanced EVA Suit Camera System Development Project

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The National Aeronautics and Space Administration (NASA) at the Johnson Space Center (JSC) is developing a new extra-vehicular activity (EVA) suit known as the Advanced EVA Z2 Suit. All of the improvements to the EVA Suit provide the opportunity to update the technology of the video imagery. My summer internship project involved improving the video streaming capabilities of the cameras that will be used on the Z2 Suit for data acquisition.

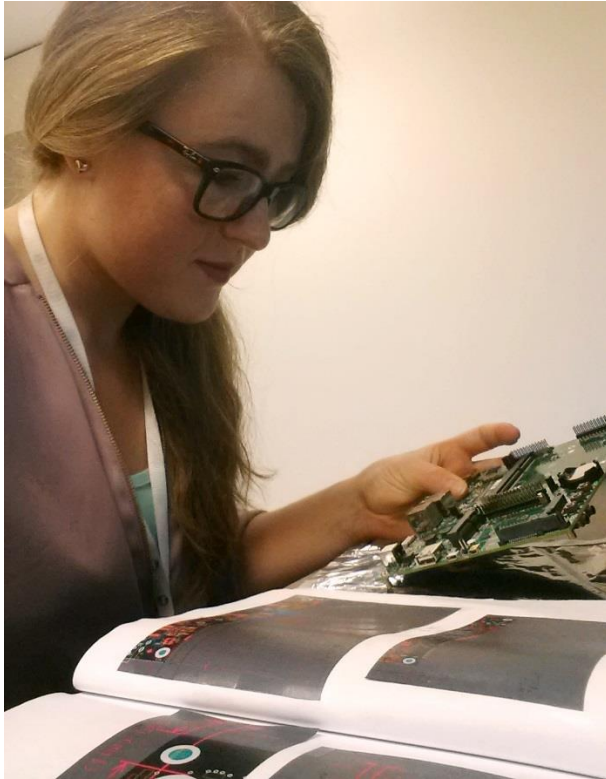
To accomplish this, I familiarized myself with the architecture of the camera that is currently being tested to be able to make improvements on the design. Because there is a lot of benefit to saving space, power, and weight on the EVA suit, my job was to use Altium Design to start designing a much smaller and simplified interface board for the camera's microprocessor and external components. This involved checking datasheets of various components and checking signal connections to ensure that this architecture could be used for both the Z2 suit and potentially other future projects. The Orion spacecraft is a specific project that may benefit from this condensed camera interface design.

The camera's physical placement on the suit also needed to be determined and tested so that image resolution can be maximized. Many of the options of the camera placement may be tested along with other future suit testing. There are multiple teams that work on different parts of the suit, so the camera's placement could directly affect their research or design. For this reason, a big part of my project was initiating contact with other branches and setting up multiple meetings to learn more about the pros and cons of the potential camera placements we are analyzing. Collaboration with the multiple teams working on the Advanced EVA Z2 Suit is absolutely necessary and these comparisons will be used as further progress is made for the overall suit design.

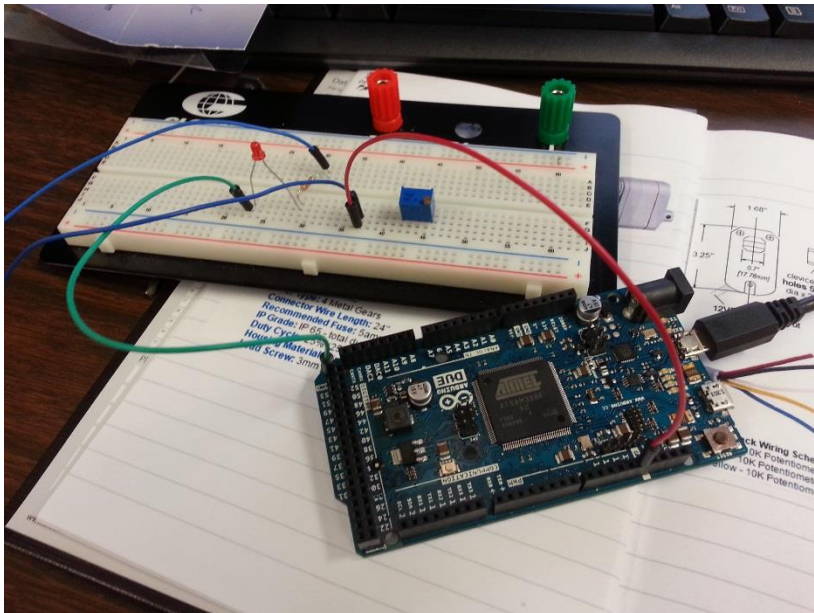
This prototype will not be finished in time for the scheduled Z2 Suit testing, so my time was also spent creating a case for the original interface board that is already being used. This design is being done by use of Creo 2. Due to time constraints, I may not be able to complete the 3-D printing portion of this design, but I was able to use my knowledge of the interface board and Altium Design to help in the task.

As a side project, I assisted another intern in selecting and programming a microprocessor to control linear actuators. These linear actuators will be used to move various increments of polyethylene for controlled radiation testing. For this, we began the software portion of the project using the Arduino's coding environment to control an Arduino Due and H-Bridge components.

Along with the obvious learning of computer programs such as Altium Design and Creo 2, I also acquired more skills with networking and collaborating with others, being able to multi-task because of responsibilities to work on various projects, and how to set realistic goals in the work place. Like many internship projects, this project will be continued and improved, so I also had the chance to improve my organization and communication skills as I documented all of my meetings and research. As a result of my internship at JSC, I desire to continue a career with NASA, whether that be through another internship or possibly a co-op. I am excited to return to my university and continue my education in electrical engineering because of all of my experiences at JSC.



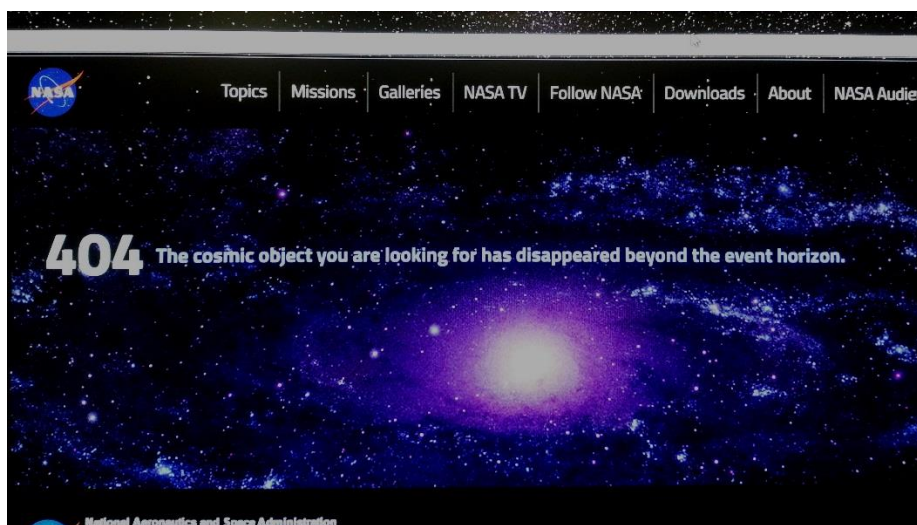
This is what a typical day looked like for me when I was sitting at my desk and learning more about the interface board and documenting everything in my lab notebook.



Here, I set up the Arduino Due to show another intern how the microcontroller works by using a simple blinking LED design.



While getting a better look at where the camera could be placed on the Z2 Suit, I got to watch a fitting test as they pressurized the suit and walked on a treadmill.



One of the days I was doing research on past cameras used by NASA, I was given this error. Even NASA's software workers know how to make you laugh when you can't find what you're looking for.